NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
ESDS Software Reuse Working Group

Software Reuse within the Earth Science Community

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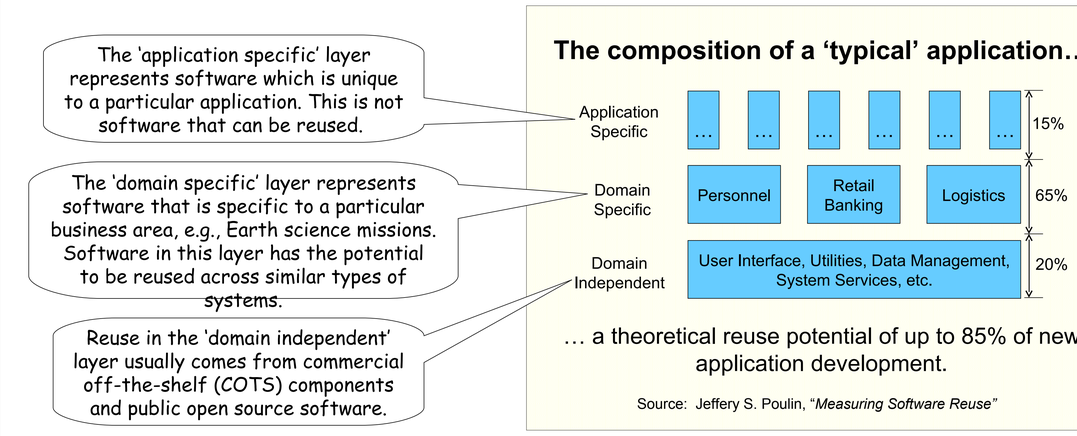
Software reuse is the reapplication of a variety of kinds of knowledge about one system to another system in order to reduce the effort of developing and maintaining that system.

Reusable assets can be from any part of the software development life cycle including: source code, analysis and design specification, plans, data, documentation, expertise and experience, and any information used to create software and software documentation.

Expected Benefits of Reuse

- Lower development costs
- Higher productivity; better use of resources
- Reduce cycle time; quicker development
- Lower training costs
- Easier maintenance
- Higher quality
- Lower risk
- Better interoperability

The composition of a 'typical' application…

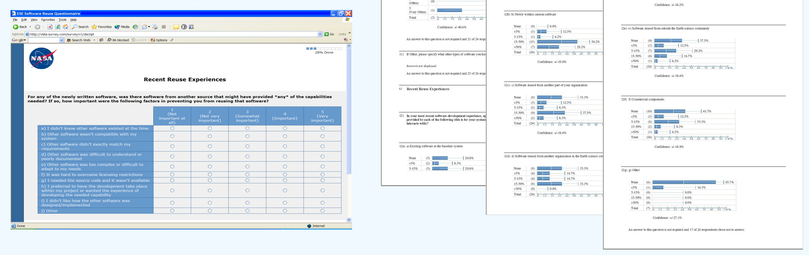


… a theoretical reuse potential of up to 85% of new application development.

Source: Jeffery S. Poulin, "*Measuring Software Reuse*"

Survey conducted to establish reuse practices and needs of the Earth science community

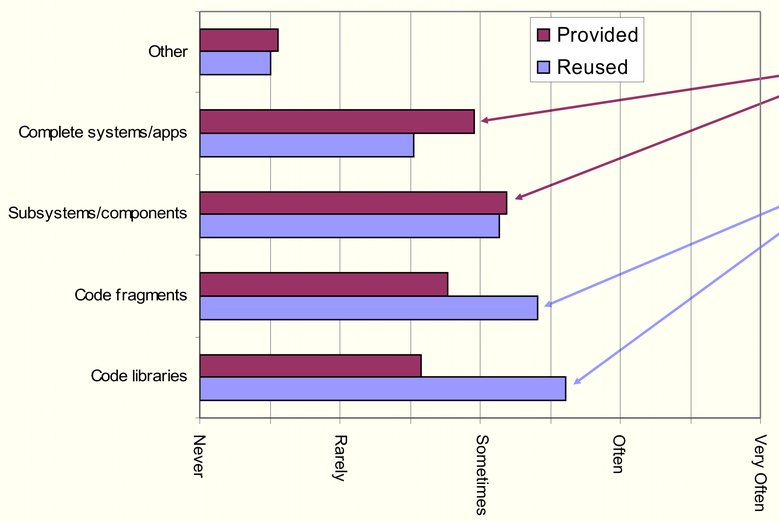
- OMB approval obtained 01/04/2005 (Approval No.: 2700-0117)
- Used Web-based survey tool (Vanguard Vista) to simplify response submission and data collection
- Approximately 3000 invitations issued
- 100 responses received



Example question screen and result pages

Survey Category	Types of Questions
Background Information	Respondent's role in software development, platforms used, programming languages used
Recent Reuse Experiences	Why respondents did or did not reuse components, factors influencing their decision, where they found components
Reusability / Developing for Reuse	What components respondents made available, factors preventing them from making components available
Community Needs	Factors to increase the level of software reuse, what respondents would reuse if it were available

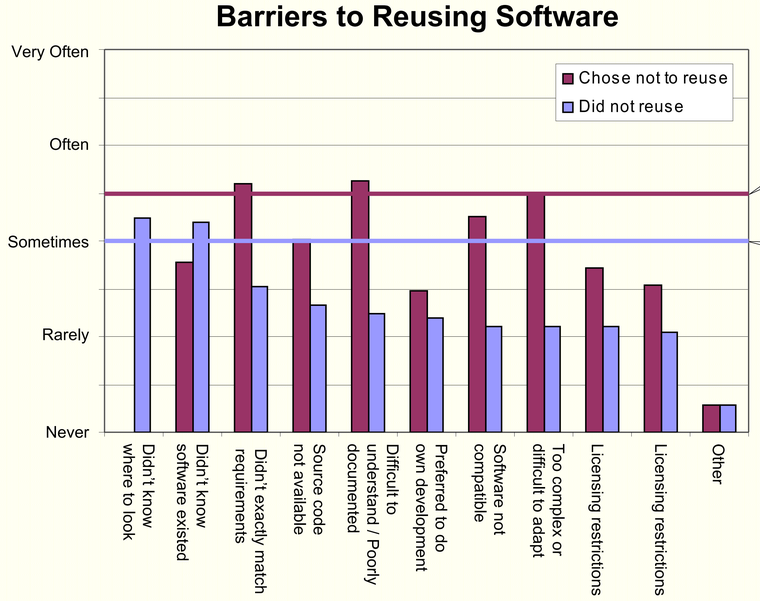
Types of Software Provided for Reuse and Reused



Software that is provided for reuse is more often the larger units of code, but respondents tend to reuse the smaller units of code.

This difference is one potential barrier to reuse. The type of software most often made available is not the kind most desired by reusers.

Barriers to Reusing Software

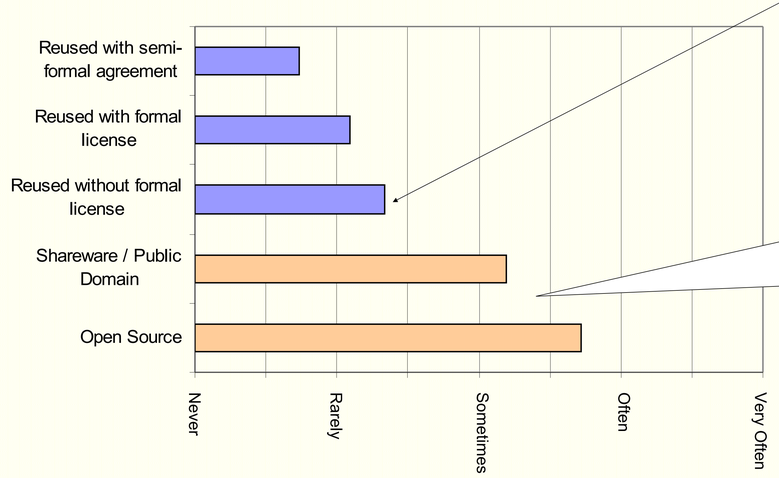


Reusers chose not to reuse software typically because it was too difficult/complex to understand/adapt or didn't meet their requirements well.

Respondents who didn't reuse software typically did not know the software existed or did not know where to look for it.

Reasons for not making software available for reuse were varied among both reusers and non-reusers. Some reasons were support and maintenance concerns, the cost of developing for reuse, and lack of a standard distribution method.

Forms of Licensing Used for Reuse

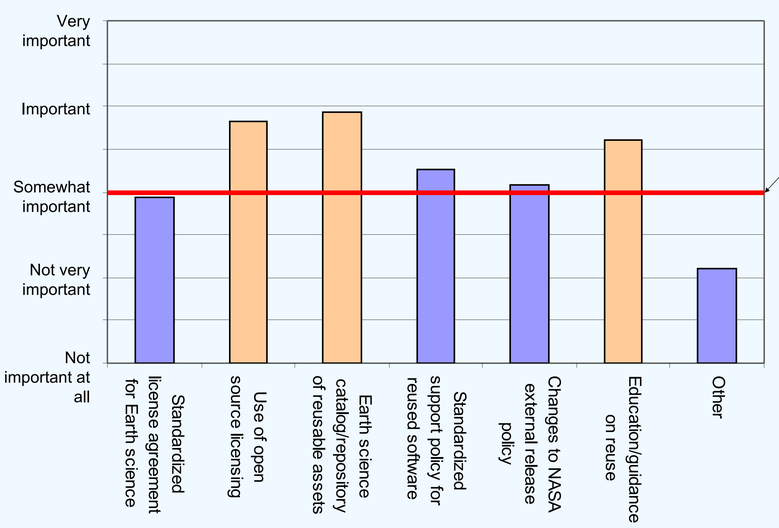


Reuse without a formal license was expected to be rare. The higher frequency suggests that informal agreements are being used in order to avoid difficulties or complications involved in the formal licensing process.

Open source licensing and shareware/public domain are clearly favored. This result is expected because the licenses are open in nature and they have standardized terms and conditions making reuse easier.

Reused assets were modified with moderate frequency, suggesting a roughly even mix of assets that need modifications and ones useable as-is. The changes made by reusers were communicated back to the developers at a somewhat lower frequency.

Increasing Reuse within the Earth Science Community



Greater use of open source licensing, a repository for Earth science artifacts, and education and guidance on reuse were identified as the most important factors in increasing the amount of reuse.

The Earth Science Data Systems Reuse Working Group has established a pilot reuse portal web site to:

- Raise awareness of software reuse within the Earth science community
- Establish a platform for community members to share/exchange resources with each other
- Be the gateway for reuse information relevant to the community
- Make access to reuse resources easier
- Become the major starting site for reuse within the community

http://softwarereuse.nasa.gov/